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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

LEE, HSIEN MING

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 06/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/052,313

Applicant(s)

HODGES ET AL.

Examiner

Hsien-Ming Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☒ Claim(s) 3 and 6 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Drive Transistor with Deposited Oxide for Print Head.

2. The disclosure is objected to because of the following informalities: on page 7, at line 19, "electrode 82" should be – electrode 42 --. Appropriate correction is required.

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: **152** (Fig.13). A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claims 3 and 6 are objected to because of the following informalities: claim 3, at line 1, "the thickness" should be – a thickness --; and in claim 6, at line 2, "poly silicon" should be – polysilicon --. Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Liu et al (US 2003/0081070).

In re claims 1, 3, 4, 5, 6, Liu et al. teach the claimed device, comprising:

- a semiconductor substrate 25 comprising a p-type silicon (paragraph [0030]) having a first surface;
- a pair of active areas, which are n-doped regions, formed in the first surface (Fig.4A);
- a deposited oxide layer 36 (paragraph [0036]) proximate the active areas, wherein a thickness of the deposited oxide 36 varies across the active areas (Fig.4C); and
- a gate 27/28 over the first surface between the pairs of active areas, wherein the gate 27/28 is composed of a gate oxide layer 27 and a polysilicon layer 28 (Fig.4C).

In re claim 2, Liu et al. also teach comprising a thermal oxide layer 32 disposed between the deposited oxide layer 36 and the first surface (top surface) of the semiconductor substrate 25 as shown in Fig. 4C.

7. Claims 7 and 9-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Gardner (US 6,200,862).

In re claims 7, 9 and 12, Gardner et al. teach the claimed method (Fig. 2A-2C), comprising:

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- depositing a layer of oxide 40 proximate a first surface of a semiconductor substrate 10 (p-type silicon, col.3, lines 24-31);
- forming a gate oxide layer 22 on the first surface, adjacent to the deposited oxide layer 40;
- forming a pair of active areas 28/34 in the first surface, adjacent to the deposited oxide layer 40 and gate oxide layer 22 (Fig.2B);
- forming a gate electrode 24 by depositing a conductive layer (polysilicon, col.3, lines 57-58) over the gate oxide layer 22 (Fig.2A);
- depositing a dielectric layer 46 over the gate electrode 24, active region 28/34, and deposited oxide layer 40 (Fig.2C); and
- forming electrical contacts 44 to the pairs of active areas 28/34 and the gate electrode 24.

In re claim 10, Gardner et al. also teach that the active areas 28/34 are formed by impurity implant and diffusion, i.e. forming source/drains (col.4, 5-30).

In re claim 11, Gardner et al. also teach that the active areas 28/34 are n-doped regions when channel is p-type (col. 3, lines 30-31 and col.4, lines 2-5).

8. Claims 19-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Hiroki et al. (US 6,485,132).

Hiroki et al. teach a method of manufacturing a fluid ejection device (Fig.4), comprising:

- forming a first (i.e. drain region 406 of p-MOS 450) and second (i.e. source region 405 of n-MOS 451) active areas in a first surface of a semiconductor substrate 401;

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- depositing a current prevention layer 416 (i.e. a silicon oxide layer) on the first surface in between the first (i.e. 406 of 450) and second (i.e. 405 of 451) active areas;
- forming a gate oxide 408 on the first surface adjacent to the second active area (i.e. 405 of 451); and
- forming a gate electrode 415 for a driver transistor 451 (i.e. the n-MOS is used for driving purpose, col. 9, lines 9-10) of the fluid ejection device on the gate oxide 408, wherein the current prevention layer 416 minimizes current flow between the first and second active areas and the gate electrode 415 because the current prevention layer 416 is a dielectric layer.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (US '070) in view of Chan (US 5,870,121).

In re claim 14, Liu et al. teach the claimed a print head, including:

- a semiconductor substrate 25 having a first surface (i.e. top surface) (Fig.4C);
- a pair of active areas, which are n-doped regions, in the first surface (Fig.4C);
- a deposited oxide 36 proximate the active areas (i.e. n-doped regions) (Fig.4C); and

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- a gate electrode 27/28 over the first surface between the pair of the active areas (Fig.4C).

Liu et al. do not teach a reservoir of fluid.

However, the fluid reservoir is a necessary component of a print cartridge, as evidenced by Chan in Fig.7, wherein a fluid reservoir 52 (i.e. ink well region) is formed in conjunction with a driver transistor 12/14/16/18, wherein the drive transistor 12/14/16/18 is equivalent to n-doped region/27/28 of Liu et al.

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made, to combine the fluid reservoir as taught by Chan with the print head of Liu et al. since by this manner it would provide a satisfactory print cartridge.

In re claims 15 and 17, Liu et al. in view of Chan also teach a plurality of thin layers 44 (i.e. heater layer, Liu et al.) disposed over the first surface, the thin layers 44 acts as a resistor (i.e. fluid ejection element) because the layer 44 is a heater layer. Alternatively, it have been obvious to one of the ordinary skill in the art, at the time the invention was made, to include resistive layer 26/27 of Chan (Figs. 6-7) over the deposited layer 36, and gate 27/28 of Liu et al. and include the fluid reservoir 52 as taught by Chan, since by this manner the resistive layer would act as a resistor, which, in turn, would act as the fluid ejection element.

In re claim 16, Liu et al. do not teach the limitations as claimed, However, it would have been obvious to one of the ordinary skill in the art to comprise an orifice layer 40 as taught by Chan disposed over the thin film layers of 44 of Liu et al. to define

a plurality of fluid ejection chamber 52 as taught by Chan for the purpose of forming a functional print cartridge.

In re claim 18, Liu et al. in view of Chan also teach that the fluid ejection element can be piezoelectric actuator (i.e. piezoelectric transducer) (col.1, lines 18-20, Chan), since by using the piezoelectric transducer it would produce a pressure pulse expelling a droplet from fluid chamber, which acts as the fluid ejection element.

11. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al. (US 862) in view of Liu et al. (US 070).

Gardner et al. teach all limitations, as stated above, but do not teach thermally growing a thermal oxide layer before depositing the layer of oxide on the first surface of the semiconductor substrate.

However, Liu et al. in an analogous art teach thermally growing a thermal oxide layer 32 before depositing the layer of oxide 36 on the first surface of the semiconductor substrate 25 (Figs 3A-3B).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made, to thermally grow the oxide as taught by Liu et al before depositing the oxide layer of Gardner et al., since by doing so it would provide a good electrical insulation for adjacent layers.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 703-305-7341. The examiner can normally be reached on M-F (9:00 ~ 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for

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the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Hsien-Ming Lee
Examiner
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May 22, 2003